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First Named Inventor: VERNSTROM, GEORGE D.
Application No.: 10/674594 Confirmation No.: 4487
Filed: September 29, 2003 Group Art Unit 1745
Title: FUEL CELL CATHODE CATALYST

AMENDED BRIEF ON APPEAL

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P.O. Box 1450
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Dear Sir:

This is an appeal from the Office Action mailed on July 3, 2006, finally rejecting claims 1-25. A Notice of Appeal in this application was mailed on October 3, 2006, and was received in the USPTO on October 3, 2006. A Brief on Appeal was transmitted April 3, 2007. A Notification of Non-Compliant Appeal Brief was mailed May 21, 2007.

A Request for an Extension of Time is being filed on even date.

- ☐ Please charge the fee provided in 37 CFR § 41.20(b)(2) to Deposit Account No. 13-3723. One copy of this sheet marked duplicate is also enclosed.
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REAL PARTY IN INTEREST

The real party in interest is 3M Company (formerly known as Minnesota Mining and Manufacturing Company) of St. Paul, Minnesota and its affiliate 3M Innovative Properties Company of St. Paul, Minnesota.

RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals or interferences.

STATUS OF CLAIMS

Claims 1-25 are pending. Claims 1-25 stand rejected. The rejection of claims 1-25 is appealed herein.

STATUS OF AMENDMENTS

No amendments have been filed after the final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 concerns a fuel cell cathode catalyst comprising nanostructured elements (defined in the Specification at page 3, lines 30-32) which comprise microstructured support whiskers (Specification at page 5, line 27 – page 6, line 6) bearing nanoscopic catalyst particles (defined in the Specification at page 4, lines 1-4). In the claims at issue, the nanoscopic catalyst particles are made by alternating application of first and second layers (Specification at page 6, line 7 – page 7, line 11), said first layer comprising platinum and said second layer being an alloy or intimate mixture of iron and a second metal selected from the group consisting of Group VIb metals, Group VIIb metals and Group VIIIb metals other than platinum and iron, where the atomic ratio of iron to said second metal in said second layer is between 0 and 10, where the planar equivalent thickness (defined in the Specification at page 4, lines 11-18) ratio of said first layer to said second layer is between 0.3 and 5, and wherein the average bilayer planar equivalent thickness (defined in the Specification at page 4, lines 19-21) of said first and second layers is less than 100 Å.

Independent claim 19 concerns a method of making a fuel cell cathode catalyst comprising nanoscopic catalyst particles (defined in the Specification at page 4, lines 1-4)

comprising the alternate steps of vacuum deposition (Specification at page 6, line 22 – page 7, line 11) of a first layer comprising platinum and vacuum deposition of a second layer comprising an alloy or intimate mixture of iron and a second metal selected from the group consisting of Group VIb metals, Group VIIb metals and Group VIIIb metals other than platinum and iron, where the atomic ratio of iron to said second metal in said second layer is between 0 and 10, wherein said deposited platinum and said deposited alloy or intimate mixture of two metals form a bilayer having an average bilayer planar equivalent thickness (defined in the Specification at page 4, lines 19-21) of less than 100 Å, wherein the planar equivalent thickness (defined in the Specification at page 4, lines 11-18) ratio of deposited platinum to the deposited alloy or intimate mixture of two metals is between 0.3 and 5.

GROUND OF REJECTION TO BE REVIEWED ON APPEAL

First Ground of Rejection

Claims 1-25 stand rejected under 35 U.S.C. § 103(a) as purportedly unpatentable over a single reference, U.S.Pat. No. 5,879,827 (Debe), taken alone.

ARGUMENT

First Ground of Rejection

Claims 1-25 stand rejected under 35 U.S.C. § 103(a) as purportedly unpatentable over a single reference, U.S.Pat. No. 5,879,827 (Debe), taken alone.

It is axiomatic that, in order to establish a prima facie case of obviousness of a claim, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974); In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)(cited at MPEP § 2143.03). In the present case, no prima facie case of obviousness have been established because the cited reference fails to teach or suggest claim limitations recited in the present claims.

Indeed, the Office Action recognizes numerous claim limitations recited in all of the present claims that are not taught in Debe (July 3 Office Action at pages 3 and 7-8), including:

--a first layer comprising platinum and said second layer being an alloy or intimate mixture of iron and a second metal selected from the group consisting of Group VIb metals, Group VIIb metals and Group VIIIb metals other than platinum and iron,

--where the atomic ratio of iron to said second metal in said second layer is between 0 and 10,

--where the planar equivalent thickness ratio of said first layer to said second layer is between 0.3 and 5, and

--wherein the average bilayer planar equivalent thickness of said first and second layers is less than 100 Å.

Claims 2-18 and 20-25 add additional features to independent claims 1 and 19, including features also not found in the single cited reference. Thus, claims 2-18 and 20-25 are patentable for those additional reasons.

The Examples of the present application (Specification at pages 7-14) include numerous demonstrations (Tables 1-8) of oxygen metric measurements for catalysts according to the present invention along with similar oxygen metric measurements for comparative catalysts (labeled "C"). The Examples demonstrate the distinct and superior performance exhibited by the catalysts according to the present invention.

Since no prima facie case of obviousness is made over this single reference, Applicants assert that the rejection of claims 1-25 under 35 U.S.C. § 103(a) should be reversed.

CONCLUSION

For the foregoing reasons, appellants respectfully submit that the Examiner has erred in rejecting this application. Please reverse the Examiner on all counts.

Respectfully submitted,

July 20, 2007

Date

By: 

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CLAIMS APPENDIX

1. (Original) A fuel cell cathode catalyst comprising nanostructured elements which comprise microstructured support whiskers bearing nanoscopic catalyst particles, said nanoscopic catalyst particles made by alternating application of first and second layers, said first layer comprising platinum and said second layer being an alloy or intimate mixture of iron and a second metal selected from the group consisting of Group VIb metals, Group VIIb metals and Group VIIIb metals other than platinum and iron, where the atomic ratio of iron to said second metal in said second layer is between 0 and 10, where the planar equivalent thickness ratio of said first layer to said second layer is between 0.3 and 5, and wherein the average bilayer planar equivalent thickness of said first and second layers is less than 100 Å.
2. (Original) The fuel cell cathode catalyst according to claim 1 wherein the planar equivalent thickness ratio of said first layer to said second layer is between 0.3 and 2.5, and wherein the average bilayer planar equivalent thickness of said first and second layers is greater than 8 Å.
3. (Original) The fuel cell cathode catalyst according to claim 1 where the atomic ratio of iron to said second metal in said second layer is between 0.01 and 10.
4. (Original) The fuel cell cathode catalyst according to claim 1 wherein said second metal is selected from the group consisting of nickel, cobalt and manganese.
5. (Original) The fuel cell cathode catalyst according to claim 3 wherein said second metal is selected from the group consisting of nickel, cobalt and manganese.
6. (Original) The fuel cell cathode catalyst according to claim 1 wherein said second metal is nickel.
7. (Original) The fuel cell cathode catalyst according to claim 6 wherein the planar equivalent thickness ratio of said first layer to said second layer is between 0.3 and 2.5, and wherein the average bilayer planar equivalent thickness of said first and second layers is greater than 8 Å.

8. (Original) The fuel cell cathode catalyst according to claim 3 wherein said second metal is nickel.
9. (Original) The fuel cell cathode catalyst according to claim 8 wherein the atomic ratio of iron to nickel in said second layer is between 0.01 and 0.4.
10. (Original) The fuel cell cathode catalyst according to claim 8 wherein the atomic ratio of iron to nickel in said second layer is between 0.01 and 0.15.
11. (Original) The fuel cell cathode catalyst according to claim 1 wherein said second metal is cobalt.
12. (Original) The fuel cell cathode catalyst according to claim 11 wherein the planar equivalent thickness ratio of said first layer to said second layer is between 0.3 and 2.5, and wherein the average bilayer planar equivalent thickness of said first and second layers is greater than 8 Å.
13. (Original) The fuel cell cathode catalyst according to claim 3 wherein said second metal is cobalt.
14. (Original) The fuel cell cathode catalyst according to claim 13 wherein the planar equivalent thickness ratio of said first layer to said second layer is between 0.3 and 2, and wherein the average bilayer planar equivalent thickness of said first and second layers is greater than 8 Å.
15. (Original) The fuel cell cathode catalyst according to claim 1 wherein said second metal is manganese.
16. (Original) The fuel cell cathode catalyst according to claim 15 wherein the average bilayer planar equivalent thickness of said first and second layers is greater than 8 Å.
17. (Original) The fuel cell cathode catalyst according to claim 3 wherein said second metal is manganese.

18. (Original) The fuel cell cathode catalyst according to claim 17 wherein the planar equivalent thickness ratio of said first layer to said second layer is between 1.25 and 5.
19. (Original) A method of making a fuel cell cathode catalyst comprising nanoscopic catalyst particles comprising the alternate steps of vacuum deposition of a first layer comprising platinum and vacuum deposition of a second layer comprising an alloy or intimate mixture of iron and a second metal selected from the group consisting of Group VIb metals, Group VIIb metals and Group VIIIb metals other than platinum and iron, where the atomic ratio of iron to said second metal in said second layer is between 0 and 10, wherein said deposited platinum and said deposited alloy or intimate mixture of two metals form a bilayer having an average bilayer planar equivalent thickness of less than 100 Å, wherein the planar equivalent thickness ratio of deposited platinum to the deposited alloy or intimate mixture of two metals is between 0.3 and 5.
20. (Original) The method according to claim 19 wherein said vacuum deposition steps are carried out substantially in the absence of oxygen.
21. (Original) The method according to claim 19 wherein said platinum and said alloy or intimate mixture of iron and a second metal are deposited on microstructured support whiskers.
22. (Original) The method according to claim 19 wherein said second metal is selected from the group consisting of nickel, cobalt and manganese.
23. (Original) The method according to claim 19 wherein said second metal is nickel.
24. (Original) The method according to claim 19 additionally comprising the step of removing at least a portion of said alloy or intimate mixture of two metals after said deposition steps.
25. (Original) A fuel cell cathode catalyst comprising nanoscopic catalyst particles made according to the method of claim 23.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.